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Life on Mars? Non-Detection of Methane Suggests No Modern-Day Microbes

By Adam MannEmail Author
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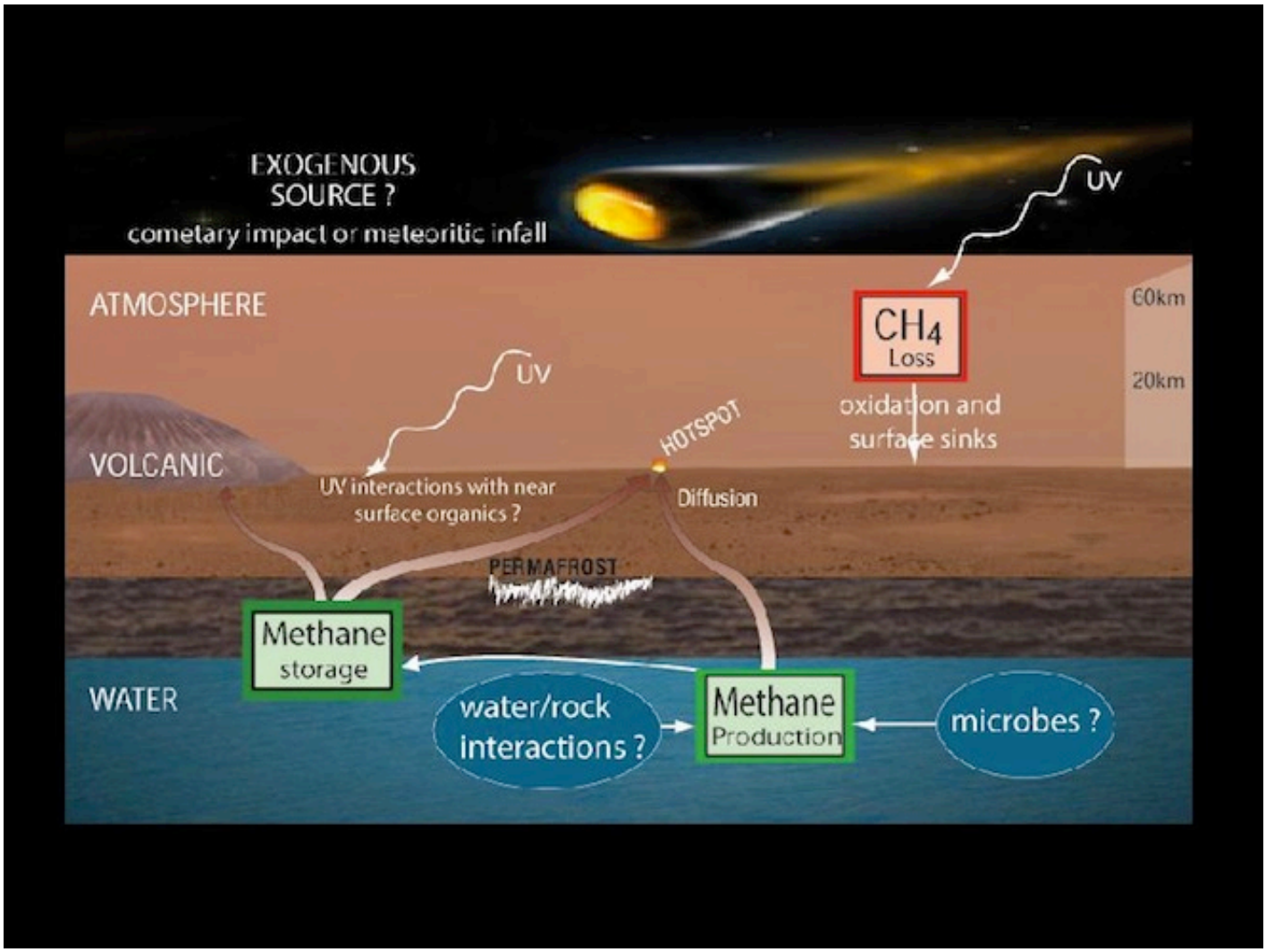


Hypothetical sources and sinks of methane on Mars. The simple organic gas could be produced by microbes or active geological processes. So far, Curiosity has not detected methane in the Martian atmosphere. *Image: NASA/JPL-Caltech, SAM/GSFC*

NASA's Curiosity rover has sniffed the Martian atmosphere for methane and, so far, turned up empty. The much-anticipated measurement strikes a blow to the hope that previous hints of methane could have been an indication of life on Mars.

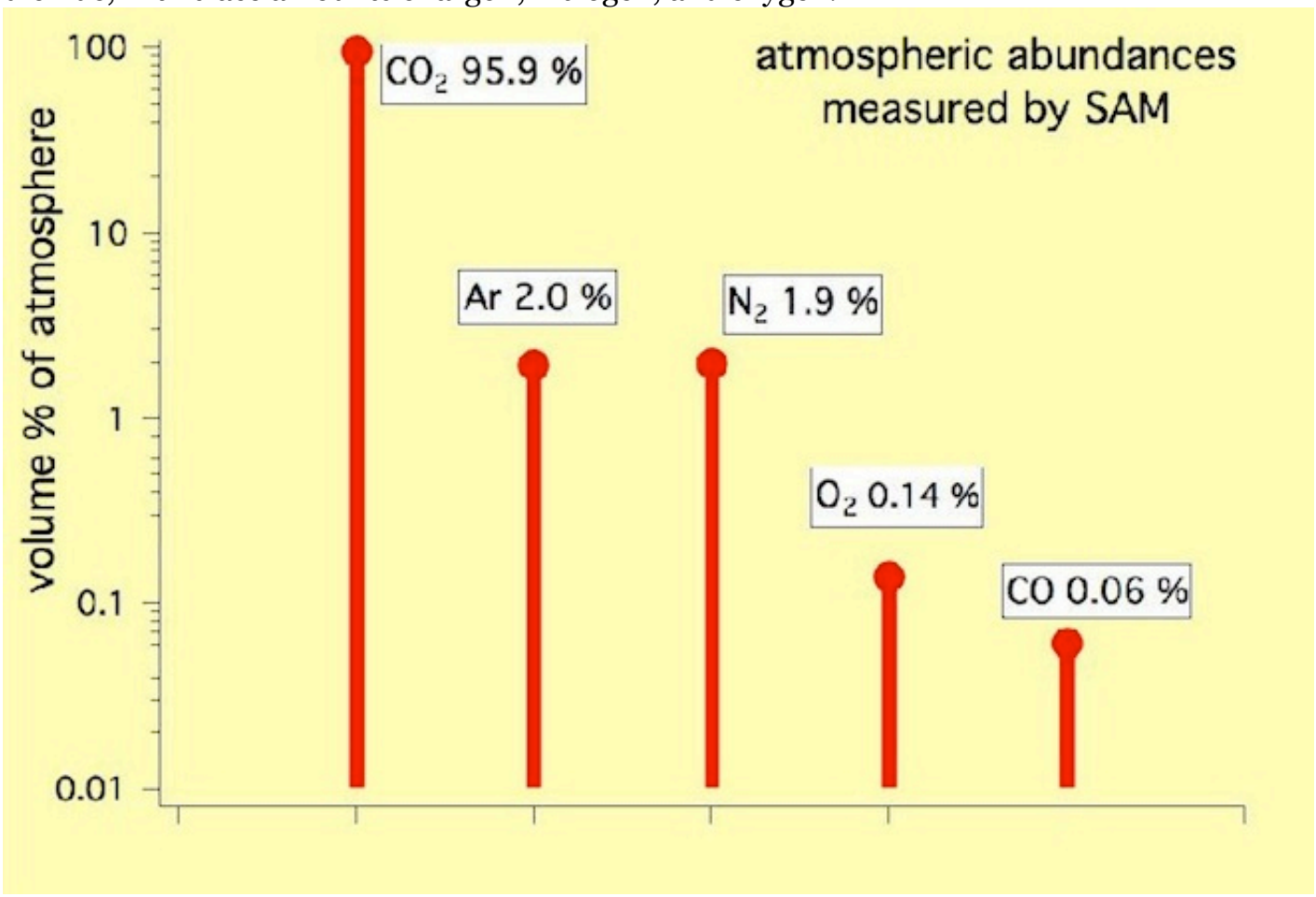
Methane, made of one carbon and four hydrogen atoms, is one of the simplest organic compounds. On Earth, 90 to 95 percent of methane in the atmosphere comes from biological activity, mainly methanogenic bacteria and cow farts. Geological activity such as water-rock interactions could have also produced the methane, which would also have overturned astronomers' view that Mars is geologically dead in the modern age. Curiosity's latest measurements seem to refute both ideas.

"So far we have no definitive detection of methane," said chemist Chris Webster, instrument lead on Curiosity's Sample Analysis at Mars (SAM) laser spectrometer, during at NASA press conference today. SAM is like the rover's "nose," able to test the Martian atmosphere and determine what chemicals are present.

In 2009, Michael Mumma of NASA's Goddard Space Flight Center in Greenbelt, Maryland used an Earth-based telescope and found hotspots of methane that appeared seasonally. Methane is quickly destroyed by ultraviolet radiation in the Martian atmosphere, usually after only a few hundred years,

so the gas could not be left over from some era millions of years ago. The detection excited much of the scientific community because these hotspots could have been areas where underground Martian microbes were alive on modern-day Mars.

Later measurements by both Mumma and other scientists cast doubt on these methane detections, and one of Curiosity's main tasks has been to provide evidence one way or another. The probe used its Tunable Laser Spectrometer (TLS) and found the atmosphere is mainly composed of carbon dioxide, with trace amounts of argon, nitrogen, and oxygen.



Curiosity's first sniff of the Martian atmosphere reveals the relative abundances of different gases. *Image: NASA/JPL-Caltech, SAM/GSFC*

Despite the lack of current detections, Curiosity's science team was quick to point out that future measurements may yet turn up methane. The gas could be produced only during some seasons or it could be destroyed too quickly right now for Curiosity to find it.

"SAM will continue to search for methane, to determine if methane does vary with time," said space scientist Sushil Atreya, co-investigator on the SAM instrument, during the NASA briefing. "So stay tuned, the story of methane has just begun."

In the meantime, Curiosity's latest measurements could bolster the case that ancient Mars was a world conducive to life. SAM sniffed out different element isotopes in the Martian atmosphere and determined that the planet lost much of its atmosphere over millions of years. Curiosity found that lighter isotopes are in lower abundances in the modern atmosphere compared to measurements of the ancient atmosphere on Mars — which come from meteorites found on Earth than contain trace samples of Mars gas. The findings indicate that as much as half of the planet's carbon dioxide could

have floated off into space over millions of years, meaning that perhaps Mars was once warmer. "We are making these measurements more precisely" than previous analysis on the Viking landers or other probes, said NASA geochemist Laurie Leshin, co-investigator on SAM and Alpha Particle X-ray Spectrometer (APXS) instruments. Coupled with measurements of Martian rocks that Curiosity will take over the course of its mission, these findings could help unravel the complex history of gas, water, and soil on Mars.

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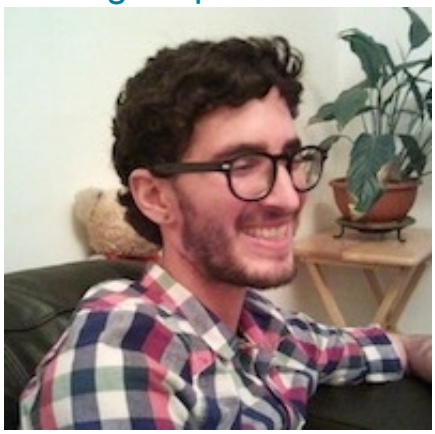

Adam is a Wired reporter and freelance journalist. He lives in Oakland, Ca near a lake and enjoys space, physics, and other sciency things.
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